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10/606,822	06/26/2003	Sang-Hyun Lee	3364P108	5522

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EXAMINER

BURD, KEVIN MICHAEL

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2611

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/606,822	Applicant(s) LEE ET AL.	
	Examiner Kevin M. Burd	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-19 and 22-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-19,22-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. This office action, in response to the amendment filed 3/6/2007, is a final office action.

Response to Arguments

2. Applicant's arguments filed 3/6/2007 have been fully considered but they are not persuasive. Applicant states Mostafa discloses a sub-sampling receiver not an SDR system. The examiner disagrees. Figure 4 discloses the wireless handset 40 comprising the subsampling receiver 50 shown in figure 8. The handset comprises a DSP 53 and Mostafa further discloses the bulk of the digital signal processing performed on both signals to be transmitted and those received, is executed by digital signal processor (DSP) 53 (column 5, lines 35-50). The processing of the signal in the DSP will be done in software. Therefore, the combination of Mostafa and Tal discloses a digital intermediate frequency signal is processed in a software defined radio system.

Applicant states the combination of Mostafa and Tal does not disclose the additionally required resources including an additional filter coefficient multiplier and an additional register corresponding to the additional filter function. The examiner disagrees. As stated in the previous office action, Tal discloses a system for dynamically adapting the length of a filter. The quality of a received signal is measured and compared to a threshold value (figure 4, blocks 154 and 158). Filter coefficients are calculated and the length of the filter is changed according to this comparison (abstract). In addition, a number of taps are either added or removed from the filter (figure 4). Each one of these added taps will require a multiplier to allow a filter coefficient to be

multiplied by the tap and a register to store the filter coefficient in an adaptive equalizer (figure 4, 150).

Applicant states the combination of Murakami and Tal does not disclose the digital filter operates in a digital intermediate frequency signal processing device in a software defined radio. The examiner disagrees. Murakami discloses a digital filter comprising a processor shown in figure 16, elements 7 and 8 for processing the signal. This processing is done by software. Murakami further discloses radio signals are transmitted and received in the system (column 1, lines 26-34). Therefore, the combination of Murakami and Tal discloses a digital intermediate frequency signal processing device in a software defined radio.

Applicant states the combination of Murakami and Tal does not disclose the additionally required resources including an additional filter coefficient multiplier and an additional register corresponding to the additional filter function. The examiner disagrees. As stated in the previous office action, Tal discloses a system for dynamically adapting the length of a filter. The quality of a received signal is measured and compared to a threshold value (figure 4, blocks 154 and 158). Filter coefficients are calculated and the length of the filter is changed according to this comparison (abstract). In addition, a number of taps are either added or removed from the filter (figure 4). Each one of these added taps will require a multiplier to allow a filter coefficient to be multiplied by the tap and a register to store the filter coefficient in an adaptive equalizer (figure 4, 150).

For these reasons and the reasons stated in the previous office action, the rejection are maintained.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 2, 5-19 and 22-24 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention. Evidence that the claims fail to correspond in scope with that which applicant regard as the invention can be found in the reply filed 3/6/2004. In that paper, applicant has stated the signal is processed in a software defined radio system, and this statement indicates that the invention is different from what is defined in the claims because the claimed invention does not claim each component of the apparatus is software defined. The specification discloses the basic concept of a software defined radio system implies a radio system that derives all the functions of the communication system other than the antennas completely in software to reconstruct all the communication functions (page 4, lines 15-23). However, claim 1 recites an apparatus with physical components such as a digital frequency mixer and receiver filters. Similar limitations are stated in all of the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 5, 6, 10-16, 19 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mostafa et al (US 7,110,732) in view of Tal et al (US 5,909,384).

Regarding claims 1, 16 and 19, Mostafa discloses an apparatus, method and recording medium for processing digital intermediate frequency signals in a radio system shown in figure 8. Digital frequency mixers 132I and 132Q convert the received intermediate frequency (IF) signal to base band (column 14, lines 41-55). Filters 134I and 134Q removes high band signals from the converted base band signals. The filters are capable of supporting multiple communication standards as long as the signals are received in a desired band. Figure 4 discloses the wireless handset 40 comprising the subsampling receiver 50 shown in figure 8. The handset comprises a DSP 53 and Mostafa further discloses the bulk of the digital signal processing performed on both signals to be transmitted and those received, is executed by digital signal processor (DSP) 53 (column 5, lines 35-50). The processing of the signal in the DSP will be done in software. Therefore, the handset is a software defined radio system since the bulk of the processing is done in software. Mostafa does not disclose a controller and coefficient calculator for calculating new filter coefficients using received information and

providing the calculated coefficient of the receiver filter to the controller. Tal discloses a system for dynamically adapting the length of a filter. The quality of a received signal is measured and compared to a threshold value (figure 4, blocks 154 and 158). Filter coefficients are calculated and the length of the filter is changed according to this comparison (abstract). In addition, a number of taps are either added or removed from the filter (figure 4). Each one of these added taps will require a multiplier to allow a filter coefficient to be multiplied by the tap and a register to store the filter coefficient in an adaptive equalizer (figure 4, 150). This will increase or decrease the performance of the system to a desired level (abstract). This allows the system to cope with the worst-case distortion situations. However, since these situations are rare, wasted consumption of CPU resources is minimized (column 1, lines 36-51). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the system of Tal into the receiver of Mostafa.

Regarding claim 2, Mostafa discloses the received radio frequency (RF) signal is down converted to an IF signal upon mixing the received signal with a local oscillator signal (column 12, lines 46-52 and figure 4). The IF signal is input to an ADC 130 before down conversion to base band.

Regarding claims 5 and 6, as stated above, Tal discloses the filter is reconfigurable according to the quality of the received signal.

Regarding claim 10 and 22, Tal discloses a cost is defined in configuring the filter's length. The desired quality of the received signal is weighed against the filter complexity and subsequent increase in power consumption.

Regarding claims 11-13 and 23, as stated above, Tal discloses dynamically adjusting the filter according to a desired quality level of the received signal (figure 4).

Regarding claims 14, 15 and 24, as stated above, Tal discloses the filter length is adjusted according to the received signal and a desired quality level. The desired quality level is input to the receiver.

5. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mostafa et al (US 7,110,732) in view of Tal et al (US 5,909,384) further in view of Murakami et al (US 6,678,317).

Regarding claim 7, the combination of Mostafa and Tal is disclosed above in paragraph 4. The combination does not disclose the structure of the receive filter. Murakami discloses the basic structure of a conventional discrete filter 6 for removing distortion caused by fading (column 3, lines 7-19 and figure 16). This filter will remove any out of band signals and noise. The filter comprises filter coefficient multipliers, registers summers and coefficient updating circuitry as shown in figure 16. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the conventional discrete filter of Murakami into the system of the combination of Mostafa and Tal. Using a simple, convention filter will reduce the cost and complexity at the receiver.

Regarding claim 8, the selection of the length of the filter and the corresponding coefficients will be used for one of the communication standards the receiver is capable of supporting.

Regarding claim 9, as stated above in paragraph 3, hardware is reduced since the combination does not require using the largest filter at all times.

6. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al (US 6,678,317) in view of Tal et al (US 5,909,384).

Regarding claim 17, Murakami discloses the basic structure of a conventional discrete filter 6 for removing distortion caused by fading (column 3, lines 7-19 and figure 16). This filter will remove any out of band signals and noise. The filter comprises filter coefficient multipliers, registers summers and coefficient updating circuitry as shown in figure 16. The filter is capable of supporting multiple communication standards as long as the signals are received in a desired band. Murakami discloses a digital filter comprising a processor shown in figure 16, elements 7 and 8 for processing the signal. This processing is done by software. Murakami further discloses radio signals are transmitted and received in the system (column 1, lines 26-34). Murakami does not disclose the digital filter is constructed to share common resources and select additionally required resources other than the shared resources by a switching operation. Tal discloses a system for dynamically adapting the length of a filter. The quality of a received signal is measured and compared to a threshold value (figure 4, blocks 154 and 158). Filter coefficients are calculated and the length of the filter is changed according to this comparison (abstract). In addition, a number of taps are either added or removed from the filter (figure 4). Each one of these added taps will require a multiplier to allow a filter coefficient to be multiplied by the tap and a register to

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store the filter coefficient in a adaptive equalizer (figure 4, 150). This will increase or decrease the performance of the system to a desired level (abstract). This allows the system to cope with the worst-case distortion situations. However, since these situations are rare, wasted consumption of CPU resources is minimized (column 1, lines 36-51). For this reason, it would have been obvious for one of ordinary skill in the art at the time of the invention to combine the system of Tal into the filter of Murakami.

Regarding claim 18, as stated above, Tal discloses the filter length is adjusted according to the received signal and a desired quality level. The desired quality level is input to the receiver.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin M. Burd
4/30/2007


KEVIN BURD
PRIMARY EXAMINER